

# ARCHIVES OF Biochemistry and Biophysics

Volume 131 • 1969

UNIVERSITY OF HAWAII  
LIBRARY

## *Executive Editors*

R. W. Estabrook  
C. H. W. Hirs  
F. M. Huennekens

S. Kaufman  
H. S. Mason  
F. F. Nord

P. K. Stumpf  
S. Udenfriend  
W. J. Whelan

## *Editors*

G. Ashwell  
A. Bendich  
J. Botts  
R. D. Cole  
D. E. Green  
F. Gros  
E. Gross  
L. P. Hager  
H. O. Halvorson  
O. Hayaishi  
L. A. Heppel  
R. L. Hill

L. E. Hokin  
B. L. Horecker  
F. E. Hunter  
H. A. Itano  
A. T. Jagendorf  
H. M. Kalckar  
E. Katchalski  
W. Kauzmann  
T. E. King  
I. M. Klotz  
W. Konigsberg  
J. M. Lowenstein

F. Lynen  
H. R. Mahler  
B. G. Malmström  
C. L. Markert  
L. Packer  
L. H. Piette  
R. R. Porter  
J. C. Rabinowitz  
L. J. Reed  
H. Rudney  
D. R. Sanadi  
W. A. Schroeder

M. Sela  
D. Shemin  
P. Siekevitz  
M. V. Simpson  
A. G. Szent-Györgyi  
T. T. Tchen  
S. N. Timasheff  
C. R. Treadwell  
B. Vennesland  
H. Weissbach  
G. Weber  
D. M. Ziegler



ACADEMIC PRESS  
*New York and London*

Copyright © 1969, by Academic Press, Inc.

ALL RIGHTS RESERVED

No part of this volume may be reproduced in any form by photostat, microfilm, or any other means, without written permission from the publishers.

*Made in the United States of America*



## Contents of Volume 131

Number 1, April 1969

|                                                                                                                                                                                                                                                                                                          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| NORMAN WELIKY, FREDERICK S. BROWN, AND EDWIN C. DALE. Carrier-Bound Proteins: Properties of Peroxidase Bound to Insoluble Carboxymethylcellulose Particles.....                                                                                                                                          | 1   |
| RALPH HEIMER, LESLIE G. CLARK, AND PAUL H. MAURER. Immunoglobulins of Sheep.....                                                                                                                                                                                                                         | 9   |
| ALBERT DEISSEROTH AND ALEXANDER L. DOUNCE. The Purification and Crystallization of Beef Erythrocyte Catalase.....                                                                                                                                                                                        | 18  |
| ALBERT B. DEISSEROTH AND ALEXANDER L. DOUNCE. Comparison of the Catalytic and Physical Properties of the Components of Lyophilized Beef Erythrocyte Catalase with those of Lyophilized Beef Liver Catalase Components.....                                                                               | 30  |
| ELIZABETH GROSS AND ANTHONY SAN PIETRO. Interaction of Uncouplers and Energy Transfer Inhibitors with High-Energy States of Chloroplasts.....                                                                                                                                                            | 49  |
| DAVID KUPFER, RUTH PARTRIDGE, AND TRUDY MUNSELL JONES. Alteration in the Magnitude of Induction of Tyrosine Transaminase by Glucocorticoids. II. Effects of Phenobarbital, <i>o</i> , <i>p'</i> DDD and Diethylaminoethyl Diphenylpropylacetate (SKF 525A) on Metabolism of Triamcinolone Acetonide..... | 57  |
| KOZO UTSUMI AND TAKUZO ODA. Inhibition of Energy Transfer Reactions in Mitochondria by Hydroxylamine.....                                                                                                                                                                                                | 67  |
| FRANCIS J. BEHAL AND MARY N. STORY. Arylamidase of Human Kidney.....                                                                                                                                                                                                                                     | 74  |
| NORIO HAYASHI, BINKOH YODA, AND GORO KIKUCHI. Mechanism of Allylisopropylacetamide-Induced Increase of $\delta$ -Aminolevulinatase Synthetase in Liver Mitochondria. IV. Accumulation of the Enzyme in the Soluble Fraction of Rat Liver...                                                              | 83  |
| G. J. CARDINALE, P. M. DREYFUS, P. AULD, AND R. H. ABELES. Experimental Vitamin B <sub>12</sub> Deficiency: Its Effect on Tissue Vitamin B <sub>12</sub> -Coenzyme Levels and on the Metabolism of Methylmalonyl-CoA.....                                                                                | 92  |
| R. C. DICKSON AND A. L. TAPPEL. Effects of Selenocystine and Selenomethionine on Activation of Sulfhydryl Enzymes.....                                                                                                                                                                                   | 100 |
| J. SCALA, G. KETNER, AND W. H. JYUNG. D-Fructose-1,6-Diphosphatase of Navy Bean ( <i>Phaseolus vulgaris</i> L.) Leaves.....                                                                                                                                                                              | 111 |
| MARCOS ROJKIND AND ANA MARIA GUTIÉRREZ. The Binding of Thiosemicarbazide to Collagen <i>in Vitro</i> .....                                                                                                                                                                                               | 116 |
| THOMAS H. CRAWFORD AND JERRY O. DALTON. ESR Studies of Copper (II) Complex Ions.....                                                                                                                                                                                                                     | 123 |
| REX LOVRIEN AND WAYNE ANDERSON. Resolution of Binding Sites in $\beta$ -Lactoglobulin.....                                                                                                                                                                                                               | 139 |
| GEORGE KALDOR, PROKASH CHOWRASHI, AND QUEI-SHIOW HSU. Comparative Studies on the Superprecipitation of Cardiac and Skeletal Myosin B.....                                                                                                                                                                | 145 |
| VINCENT A. ZIBOH AND S. L. HSIA. Lipogenesis in Rat Skin: A Possible Regulatory Role of Glycerol 3-Phosphate.....                                                                                                                                                                                        | 153 |
| W. R. JONDORF, J. D. DRASSNER, R. K. JOHNSON, AND H. H. MILLER. Effect of Various Compounds Related to Emetine on Hepatic Protein Synthesis in the Rat...                                                                                                                                                | 163 |
| D. H. BERRY AND P. HOCHSTEIN. Membrane Acid Phosphatase in Rabbit Erythrocytes.....                                                                                                                                                                                                                      | 170 |
| MICHAEL P. COUGHLAN, K. V. RAJAGOPALAN, AND PHILIP HANDLER. On the Inducibility of a Pancreatic Lactase.....                                                                                                                                                                                             | 177 |
| ALFRED CHANUTIN AND ELIANA HERMANN. The Interaction of Organic and Inorganic Phosphates with Hemoglobin.....                                                                                                                                                                                             | 180 |
| NICHOLAS CATSIMPOOLAS. Isolation of Soybean Lipoxidase by Isoelectric Focusing...                                                                                                                                                                                                                        | 185 |



|                                                                                                                                                                                                                                                               |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| MIKIO TOMOYEDA, YOSHIHARU ETO, AND TOSHIHIKO YOSHINO. Studies on Ribonuclease Produced by <i>Rhizopus</i> Sp. I. Crystallization and Some Properties of the Ribonuclease.....                                                                                 | 191 |
| AKIRA KAJI AND TAKEHISA OKADA. Purification and Properties of an Unusually Acid-Stable Endo-Polygalacturonase Produced by <i>Corticium rolfsii</i> .....                                                                                                      | 203 |
| ALEXANDER L. DOUNCE AND REGINA ICKOWICZ. A Study of Optimal Conditions for Separating Protein Fractions from Isolated Cell Nuclei.....                                                                                                                        | 210 |
| E. H. EYLAR AND G. A. HASHIM. Allergic Encephalomyelitis: Cleavage of the C-Tryptophyl Bond in the Encephalitogenic Basic Protein from Bovine Myelin.....                                                                                                     | 215 |
| TAKASHI KAWASAKI, IKUNOSUKE MIYATA, KIMIKO ESAKI, AND YOSHITSUGU NOSE. Thiamine Uptake in <i>Escherichia coli</i> . I. General Properties of Thiamine Uptake System in <i>Escherichia coli</i> .....                                                          | 223 |
| TAKASHI KAWASAKI, IKUNOSUKE MIYATA, AND YOSHITSUGU NOSE. Thiamine Uptake in <i>Escherichia coli</i> . II. The Isolation and Properties of a Mutant of <i>Escherichia coli</i> Defective in Thiamine Uptake.....                                               | 231 |
| JOHN DALY, DONALD JERINA, JOYCE FARNSWORTH, AND GORDON GUROFF. The Migration of Deuterium during Aryl Hydroxylation. II. Effect of Induction of Microsomal Hydroxylases with Phenobarbital or Polycyclic Aromatic Hydrocarbons.....                           | 238 |
| JULIAN A. PETERSON, EVA J. MCKENNA, RONALD W. ESTABROOK, AND MINOR J. COON. Enzymic $\omega$ -Oxidation: Stoichiometry of the $\omega$ -Oxidation of Fatty Acids....                                                                                          | 245 |
| ARTHUR KAHLBERG, NORMAN C. DULAK, JOHN F. DIXON, PETER R. GALSORTHY, AND LOWELL E. HOKIN. Studies on the Characterization of the Sodium-Potassium Transport Adenosinetriphosphatase. V. Partial Purification of the Lubrol-Solubilized Beef Brain Enzyme..... | 253 |
| IRA WEINRYB AND ROBERT F. STEINER. The Properties of Some Phenylalanyl Peptides in Ethylene Glycol-Aqueous Buffer Solvent.....                                                                                                                                | 263 |
| R. D. MACELROY, E. J. JOHNSON, AND M. K. JOHNSON. Control of ATP-Dependent CO <sub>2</sub> Fixation in Extracts of <i>Hydrogenomonas facilis</i> : NADH Regulation of Phosphoribulokinase.....                                                                | 272 |
| ROBERT F. DIEGELMANN, OLGA ONDREJICKOVA, AND EDWARD KATZ. Oxygen-18 and Fluoroproline Studies on the Synthesis of Hydroxyproline and Oxoproline in Actinomycin.....                                                                                           | 276 |
| REGINA PIETRUSZKO AND HUGO THEORELL. Subunit Composition of Horse Liver Alcohol Dehydrogenase.....                                                                                                                                                            | 288 |
| Z. GROMET-ELHANAN. Inhibitors of Photophosphorylation and Photoreduction by Chromatophores from <i>Rhodospirillum rubrum</i> .....                                                                                                                            | 299 |
| TOMMASO GALEOTTI, ANGELO AZZI, AND BRITTON CHANCE. The Flavoproteins of Ascites Tumor Cells.....                                                                                                                                                              | 306 |
| C. L. JOHNSON, J. ORO, AND A. SCHWARTZ. Basic Protein Induction of Low Amplitude Energy-Linked Mitochondrial Swelling.....                                                                                                                                    | 310 |
| R. A. HARRIS, M. A. ASBELL, AND D. E. GREEN. Correlation between Light-Scattering Changes and the Energy State of Phosphorylating Submitochondrial Particles..                                                                                                | 316 |

## COMMUNICATIONS

|                                                                                                                                                                                    |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| H. G. FLOSS, H. GUENTHER, D. GROEGER, AND D. ERGE. Origin of the Oxygen Atoms in the Conversion of Anthranilic Acid to 2,3-Dihydroxybenzoic Acid by <i>Claviceps paspali</i> ..... | 319 |
| THEODORE H. HERSKOVITS AND GERMAN B. VILLANUEVA. On the Location of the Tyrosyl and Tryptophyl Residues in Trypsin and Trypsinogen.....                                            | 321 |
| DONALD F. H. WALLACH, JOHN M. GRAHAM, AND BARRY R. FERNBACH. Beta-Conformation in Mitochondrial Membranes.....                                                                     | 322 |
| Author Index.....                                                                                                                                                                  | 325 |

Number 2, May 1969

|                                                                                                                                              |     |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----|
| ADA L. JACOBSON AND JOYCE STAPLETON. Effect of <i>N</i> -Propyl Thiouracil on Muscle....                                                     | 327 |
| S. K. MUKERJI AND IRWIN P. TING. Malic Dehydrogenase Isoenzymes in Green Stem Tissue of <i>Opuntia</i> : Isolation and Characterization..... | 336 |



|                                                                                                                                                                                                                                                                                          |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| G. MAGGIORA, H. JOHANSEN, AND L. L. INGRAHAM. The Electronic Spectra of the Isomers of Reduced 1-Alkyl-Nicotinamide.....                                                                                                                                                                 | 352 |
| ALEXANDER L. DOUNCE AND R. ICKOWICZ. The effect of the Method of Isolation of Cell Nuclei on the Ratios of Nuclear Proteins to DNA.....                                                                                                                                                  | 359 |
| RUSSELL A. PROUGH, JUDITH A. WITTKOP, AND DONALD J. REED. Evidence for the Hepatic Metabolism of Some Monoalkylhydrazines.....                                                                                                                                                           | 369 |
| WILLIAM T. JACKSON, MAX SCHLAMOWITZ, ANITA SHAW, AND RALPH TRUJILLO. The Effect of pH on the Kinetic Constants of Peptic Substrates and Inhibitors.....                                                                                                                                  | 374 |
| LESTER PACKER AND KOZO UTSUMI. The Relation of Respiration-dependent Proton Transfer to Mitochondrial Structure.....                                                                                                                                                                     | 386 |
| CARLO DI BENEDETTA, ERIC G. BRUNNGRABER, GREENE WHITNEY, BARBARA D. BROWN, AND AURELIA ARO. Compositional Patterns of Sialofucohexosaminoglycans Derived from Rat Brain Glycoproteins.....                                                                                               | 404 |
| C. J. WATSON, M. WEIMER, Z. J. PETRYKA, D. A. LIGHTNER, A. MOSCOWITZ, E. DAVIS, AND N. A. BEACH. A New Method of Interpretation of the Ferric Chloride Oxidation Patterns of the Urobilinoids.....                                                                                       | 414 |
| STANLEY J. ROUX AND WILLIAM S. HILLMAN. The Effect of Glutaraldehyde and Two Monoaldehydes on Phytochrome.....                                                                                                                                                                           | 423 |
| U. HORNEMANN, M. K. SPEEDIE, K. M. KELLEY, L. H. HURLEY, AND H. G. FLOSS. Biosynthesis of Indoleisopropionic Acid by <i>Claviceps</i> . Biological C-Methylation Involving an Intact Methyl Group.....                                                                                   | 430 |
| SAMUEL GALLANT AND ALEXANDER C. BROWNIE. Corticosteroidogenesis and Cytochrome Levels in the Regenerating Rat Adrenal.....                                                                                                                                                               | 441 |
| ORA M. ROSEN AND SAMUEL M. ROSEN. Properties of an Adenyl Cyclase Partially Purified from Frog Erythrocytes.....                                                                                                                                                                         | 449 |
| PHILIP PERSON, HERBERT ZIPPER, AND JOSEPH H. FELTON. Cytochrome Oxidase Solubilization at High pH I. Effects of pH, Ca <sup>2+</sup> and Mg <sup>2+</sup> on the Reversible Solubilization of Cytochrome Oxidase and Cytochrome <i>b</i> by Synthetic Zeolites and by EDTA.....          | 457 |
| PHILIP PERSON, JOSEPH H. FELTON, DANIEL J. O'CONNELL, HERBERT ZIPPER, AND DELBERT E. PHILPOTT. Cytochrome Oxidase Solubilization at High pH II. Separation and Partial Isolation of Cytochrome Oxidase from Beef Heart Mitochondria without Use of Detergents or Sonic Oscillations..... | 470 |
| RANDALL WOOD AND FRED SNYDER. Tumor Lipids: Metabolic Relationships Derived from Structural Analyses of Acyl, Alkyl, and Alk-1-enyl Moieties of Neutral Glycerides and Phosphoglycerides.....                                                                                            | 478 |
| RANDALL WOOD AND R. D. HARLOW. Structural Studies of Neutral Glycerides and Phosphoglycerides of Rat Liver.....                                                                                                                                                                          | 495 |
| KEI YAMANAKA. Inhibition of D-Xylose Isomerase by Pentitols and D-Lyxose.....                                                                                                                                                                                                            | 502 |
| A. D. DEODHAR AND S. P. MISTRY. Restoration of Gluconeogenesis in Biotin-Deficient Rats.....                                                                                                                                                                                             | 507 |
| MARIAN M. WANG, K. C. TSOU, AND ROBERT F. NORRIS. The Depolymerization of "Bifidan," a Polysaccharide of <i>Lactobacillus bifidus</i> , by Ascorbic Acid.....                                                                                                                            | 513 |
| W. L. RYAN, R. J. JOHNSON, AND S. DIMARI. Homoarginine Synthesis by Rat Kidney.....                                                                                                                                                                                                      | 521 |
| ERNESTO CARAFOLI, CARLO STEFANO ROSSI, AND PAOLO GAZZOTTI. The Effect of Uncoupling Agents and Detergents on the Movements of Monovalent Cations between Mitochondria and Medium.....                                                                                                    | 527 |
| T. AOKI, L. S. HNILICA, AND A. C. GRIFFIN. The Effect of Histone Fractions on Liver Catalase and Tryptophan Pyrrolase Activities.....                                                                                                                                                    | 538 |
| GORDON GUROFF, KATHERINE BROMWELL, AND AMNON ABRAMOWITZ. Mode of Action of <i>p</i> -Chlorophenylalanine on <i>Pseudomonas</i> Species (11299a).....                                                                                                                                     | 543 |
| J. CLAUDE BENNETT. Studies on the Structural Variation of the H Chain of Immunoglobulin M(IgM).....                                                                                                                                                                                      | 551 |
| JOSEPH A. ULIANA AND RUSSELL F. DOOLITTLE. Pyrrolidonecarboxyl Peptidase: Studies on the Specificity of the Enzyme.....                                                                                                                                                                  | 561 |
| D. A. LIGHTNER, A. MOSCOWITZ, Z. J. PETRYKA, S. JONES, M. WEIMER, E. DAVIS, N. A. BEACH, AND C. J. WATSON. Mass Spectrometry and Ferric Chloride Oxidation Applied to Urobilinoid Structures.....                                                                                        | 566 |

|                                                                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| N. CATSIMPOOLAS, T. G. CAMPBELL, AND E. W. MEYER. Association-Dissociation Phenomena in Glycinin.....                                                                | 577 |
| PETER BERNFELD AND ROBERT E. BIEBER. Water-Insoluble Enzymes: Kinetics of Rabbit Muscle Enolase Embedded within an Insoluble Carrier.....                            | 587 |
| JEN-SIE TOU, M. W. HURST, AND C. G. HUGGINS. Phosphatidylinositol Kinase in Rat Kidney Cortex.....                                                                   | 596 |
| HIROSHI OKAMOTO AND OSAMU HAYAISHI. Solubilization and Partial Purification of Kynurenine Hydroxylase from Mitochondrial Outer Membrane and Its Electron Donors..... | 603 |
| DAVID SHEPHERD AND IRWIN H. SEGEL. Glycogen Phosphorylase of <i>Neurospora crassa</i> .....                                                                          | 609 |
| M. LUPO, Y. S. HALPERN, AND D. SULITZEANU. Immunological Studies on the L-Glutamic Acid Decarboxylase from <i>Escherichia coli</i> K-12.....                         | 621 |
| RICHARD C. STANCLIFF, MARY ANN WILLIAMS, KOZO UTSUMI, AND LESTER PACKER. Essential Fatty Acid Deficiency and Mitochondrial Function.....                             | 629 |
| CLARA Y. LIM-SYLIANCO AND CLARENCE P. BERG. The Effect of the Configuration of Histidine upon Its Metabolism.....                                                    | 643 |

## COMMUNICATIONS

|                                                                                                                                                                        |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| PETER OVE, OLIVER E. BROWN, AND JOHN LASZLO. DNase II Inhibitor in Tissues and Urine—pH and Salt Artifacts.....                                                        | 652 |
| W. A. SCHROEDER, J. ROGER SHELTON, JOAN BALOG SHELTON, BARBARA ROBERSON, AND GERALD APELL. The Amino Acid Sequence of Bovine Liver Catalase: A Preliminary Report..... | 653 |
| M. RIEBER AND G. BEMSKI. On the Mycobactericidal Effect of the Interaction Isoniazid-Copper.....                                                                       | 655 |
| Errata.....                                                                                                                                                            | 659 |
| Author Index.....                                                                                                                                                      | 660 |
| Subject Index.....                                                                                                                                                     | 662 |



# Neurosciences Research

Edited by **Seymour Ehrenpreis**

*Department of Pharmacology, New York Medical College  
Flower and Fifth Avenue Hospitals, New York, New York*

**Othmar C. Solnitzky**

*Department of Anatomy, Georgetown University  
School of Medicine, Washington, D.C.*

## ADVISORY BOARD

**M. H. Aprison**  
**William Adelman**

**Amedeo Marrazzi**  
**Fred A. Mettler**

**I. J. Kopin**  
**Ezio Giacobini**

This new serial publication will present the most recent advances in all aspects of neural activity under normal and abnormal conditions. The aim is to stimulate further neurobiological research, emphasizing the greater understanding of behavior, memory, and thought processes. Contributions will be written by established investigators, each discussing an important area of research from a multidisciplinary approach. Most chapters will include background material on the subject, a critical review of recent work, as well as the author's own contributions to the subject and his speculations for the study of unsolved problems.

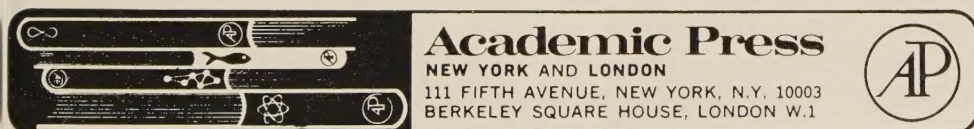
## VOLUME 1

### CONTENTS:

**Ezio Giacobini**, Chemical Studies on Individual Neurons. Part I: Vertebrate Nerves  
**Georges Ungar** and **Louis N. Irwin**, Chemical Correlates of Neural Function  
**M. H. Aprison** and **R. Werman**, A Combined Neurochemical and Neurophysiological Approach to Identification of Central Nervous System Transmitters  
**Fred A. Mettler**, Muscular Tone and Movement: Their Cerebral Control in Primates  
**Paul C. Bucy**, Neural Mechanism Controlling Skeletal Muscular Activity and Its Unsolved Problems  
**Roland Fischer** and **Marsha A. Rockey**, Psychophysics of Excitation and Tranquilization From a Steady-State Perspective  
**Jacques Barbizet**, Learning and the Use of Knowledge  
**E. S. Gurdjian**, **V. R. Hodgson**, **L. M. Thomas**, and **L. M. Patrick**, High-Speed Techniques in Biological Research and their Utilization in Experimental Head Injury  
AUTHOR INDEX—SUBJECT INDEX.

1968, 367 pp., \$17.50

AP 2246



# Bioelectronics

A Study in Cellular Regulations,  
Defense, and Cancer

By **Albert Szent-Györgyi**

*Institute for Muscle Research  
Marine Biological Laboratory  
Woods Hole, Massachusetts*

In his two earlier books *Bioenergetics* and *Introduction to a Submolecular Biology*, Professor Szent-Györgyi, Nobel Laureate in Physiology and Medicine, advocated the extension of biology into the sub- and supramolecular dimension. The present work completes the trilogy.

## **CONTENTS:**

### INTRODUCTION

The Problem Is Stated

The Ionization Potential and Electron Affinity

The Biopotentials

Electronic Energy and Bond Energy

The Pullman *K*

### ELECTRONIC MOBILITY

Three Cases of Delocalization

Charge Transfer

### BIOLOGICAL RELATIONS

Middle-Range Charge Transfer

Electron Donors of Tissues. The Hopkins Pool

Functional Groups and Regulations

### PHYSIOLOGY AND PATHOLOGY

Defense Mechanisms

Physical State and Cell Division

Methylglyoxal and the Regulation of Cell Division

On Cancer

1968, 93 pp., \$4.95

AP 2271



**Academic Press**  
NEW YORK AND LONDON

111 FIFTH AVENUE, NEW YORK, N.Y. 10003  
BERKELEY SQUARE HOUSE, LONDON W.1

